

CLAIMS

We claim:

- 1 1. A microbolometer circuit comprising:
- 2 a first microbolometer;
- 3 a variable resistor coupled to the first microbolometer;
- 4 and
- 5 a biasing circuit coupled to the first microbolometer or
- 6 the variable resistor to provide a load current.
- 1 2. The circuit of Claim 1, wherein the biasing circuit
- 2 comprises a second microbolometer.
- 1 3. The circuit of Claim 2, further comprising an
- 2 amplifier coupled at a node between the first microbolometer and
- 3 the second microbolometer for providing an output signal from
- 4 the microbolometer circuit

1 4. The circuit of Claim 2, further comprising a
2 transistor, coupled between the first microbolometer and the
3 second microbolometer, for biasing the amount of current flowing
4 through at least one of the first microbolometer and the second
5 microbolometer.

1 5. The circuit of Claim 4, further comprising a variable
2 voltage source coupled to a gate terminal of the transistor and
3 controlling the biasing of the transistor.

1 6. The circuit of Claim 4, further comprising a first
2 amplifier coupled to a gate terminal of the transistor, wherein
3 the amplifier is responsive to a reference voltage to control
4 the transistor.

1 7. The circuit of Claim 6, further comprising a digital-
2 to-analog converter providing the reference voltage.

1 8. The circuit of Claim 1, wherein the variable resistor
2 is calibrated over a range of temperatures to compensate for a
3 temperature coefficient of resistance difference between the
4 first microbolometer and the biasing circuit.

1 9. The circuit of Claim 2, further comprising a resistor
2 coupled to the second microbolometer, the resistor calibrated to
3 adjust a temperature coefficient of resistance of the second
4 microbolometer.

1 10. The circuit of Claim 3, further comprising a variable
2 voltage source coupled to the amplifier to provide a voltage
3 reference level.

1 11. The circuit of Claim 1, further comprising a first
2 voltage source coupled to the first microbolometer to bias the
3 first microbolometer.

1 12. The circuit of Claim 11, further comprising a second
2 voltage source coupled to the biasing circuit.

1 13. The circuit of Claim 2, further comprising:

2 a first transistor coupled to the first microbolometer to
3 control the amount of current flowing through the first
4 microbolometer; and

5 a second transistor coupled to the second microbolometer to
6 control the amount of current flowing through the second
7 microbolometer.

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1 14. The circuit of Claim 13, further comprising a first
2 variable voltage source coupled a gate terminal of the first
3 transistor and a second variable voltage source coupled to a
4 gate terminal of the second transistor.

1 15. The circuit of Claim 13, further comprising a
2 transimpedance amplifier coupled between the first and second
3 transistor.

1 16. A microbolometer circuit comprising:
2 a first microbolometer;
3 a current source coupled to the first microbolometer;
4 a second microbolometer coupled to the first
5 microbolometer; and
6 an amplifier coupled to a node between the first
7 microbolometer and the second microbolometer to provide an
8 output signal from the microbolometer circuit.

1 17. The circuit of Claim 16, wherein the current source is
2 calibrated to compensate for a temperature coefficient of
3 resistance difference between the first microbolometer and the
4 second microbolometer.

1 18. The circuit of Claim 16, further comprising a resistor
2 coupled to the second microbolometer, the resistor calibrated to
3 adjust a temperature coefficient of resistance of the second
4 microbolometer.

1 19. The circuit of Claim 16, further comprising at least
2 one transistor coupled between the first microbolometer and the
3 second microbolometer to control the amount of current flowing
4 through the microbolometer circuit.

1 20. The circuit of Claim 16, further comprising a first
2 voltage source coupled to the first microbolometer to bias the
3 first microbolometer.

1 21. The circuit of Claim 20, further comprising a second
2 voltage source coupled to the second microbolometer.

1 22. A two-dimensional array comprising a plurality of
2 microbolometer circuits according to Claims 1 or 16.

1 23. A microbolometer focal plane array comprising:
2 an array of microbolometer cells, each containing a first
3 microbolometer; and
4 a temperature compensation circuit associated with each
5 microbolometer cell, each temperature compensation circuit
6 comprising a variable resistor.

1 24. The circuit of Claim 23, wherein the temperature
2 compensation circuit further comprises a second microbolometer
3 coupled to the variable resistor.

1 25. The circuit of Claim 23, wherein the variable resistor
2 is calibrated to compensate for a temperature coefficient of
3 resistance difference between the first microbolometer and the
4 second microbolometer.

1 26. The circuit of Claim 23, further comprising an
2 amplifier coupled to at least one of the first microbolometer
3 and the temperature compensation circuit to provide an output
4 signal.

1 27. The circuit of Claim 26, further comprising a
2 reference circuit coupled to the amplifier to provide a
3 reference voltage.

1 28. The circuit of Claim 26, further comprising a
2 processor coupled to the amplifier to receive the output signal.

1 29. The circuit of Claim 28, wherein the processor is
2 coupled to the microbolometer focal plane array to provide input
3 signals to control each of the temperature compensation
4 circuits.

1 30. The circuit of Claim 29, wherein the processor sets
2 the value of the variable resistor corresponding to each
3 microbolometer cell.

1 31. The circuit of Claim 24, wherein each temperature
2 compensation circuit comprises at least one transistor coupled
3 to the second microbolometer to control the amount of current
4 flowing through the second microbolometer.

1 32. The circuit of Claim 31, further comprising a variable
2 voltage source coupled to a gate terminal of the transistor.

1 33. The circuit of Claim 24, further comprising a resistor
2 coupled to the second microbolometer to adjust a temperature
3 coefficient of resistance of the second microbolometer.

1 34. The circuit of Claim 24, further comprising a first
2 voltage source coupled to each of the first microbolometers to
3 bias the first microbolometers.

1 35. The circuit of Claim 34, further comprising a second
2 voltage source coupled to each of the second microbolometers.

1 36. A method of calibrating a microbolometer detector
2 circuit, the method comprising:

3 calibrating a first variable resistor to compensate for a
4 relative temperature coefficient of resistance between an active
5 microbolometer and a load over a desired temperature range; and

6 calibrating an offset for an output signal generated by the
7 microbolometer detector circuit.

1 37. The method of Claim 36, wherein the load comprises a
2 reference microbolometer.

1 38. The method of Claim 37, further comprising calibrating
2 a resistance value for a second resistor to adjust a temperature
3 coefficient of resistance for the reference microbolometer.

1 39. The method of Claim 36, further comprising calibrating
2 a fine correction to the output signal over the desired
3 temperature range.

1 40. The method of Claim 39, wherein the fine correction
2 calibration comprises a polynomial that generates an offset to
3 the output signal based on a temperature of the microbolometer
4 detector circuit.

1 41. The method of Claim 36, further comprising calibrating
2 a uniform gain to the output signal over the desired temperature
3 range.

1 42. The method of Claim 41, further comprising calibrating
2 an additional offset to the output signal over the desired
3 temperature range.

1 43. A method of detecting the level of incident infrared
2 radiation, the method comprising:
3 providing an active microbolometer to receive the infrared
4 radiation;
5 applying a voltage potential to the active microbolometer;
6 providing a reference microbolometer to provide a reference
7 relative to the active microbolometer;
8 providing compensation for a temperature coefficient of
9 resistance difference between the active microbolometer and the
10 reference microbolometer over a certain temperature range; and
11 generating an output signal based on a change in resistance
12 of the active microbolometer due to the received infrared
13 radiation level.

1 44. The method of Claim 43, wherein the compensation
2 provided for the temperature coefficient of resistance comprises
3 a variable resistor whose value is calibrated over the
4 temperature range.

1 45. The method of Claim 43, wherein the compensation
2 provided for the temperature coefficient of resistance comprises
3 a current source, for the active microbolometer, whose value is
4 calibrated over the temperature range.